UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF MICHIGAN
(SOUTHERN DIVISION)

IMRA AMERICA, INC., a Michigan corporation, Plaintiff/Counterclaim Defendant, v. IPG PHOTONICS CORPORATION, a Delaware corporation, Defendant/Counterclaim Plaintiff.	Case No.: 2:06-15139 Judge: Hon. Anna Diggs Taylor Magistrate: Hon. Mona K. Majzoub

DEFENDANT IPG PHOTONICS CORPORATION'S OPENING CLAIM CONSTRUCTION BRIEF

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Pursuant to the November 13, 2009, Amended Scheduling Order (Doc. 76), and the parties' December 3, 2009, stipulation to extend deadlines for claim construction briefing, Defendant and Counterclaim Plaintiff IPG Photonics Corporation submits the following brief in support of its proposed claim constructions.

I. INTRODUCTION

In this action, IMRA America, Inc. ("IMRA") alleges that IPG Photonics Corporation ("IPG") infringes claims 1, 10-12, 24, 25, 27-29, 31, 36, 37, 39, and 46-49 of one IMRA patent, U.S. Patent No. 5,818,630 (the "'630 patent"). By virtue of the meet-and-confer process, the parties have been able to reduce the number of claim terms in dispute to only four.

The '630 patent is directed to a complex optical amplifier apparatus for producing a high-quality amplified beam of light, such as for telecommunications or industrial applications. The principal term in dispute is one component of the amplifier, which the patent labels a "mode converter." The "mode converter" is at the heart of IMRA's patent, including all of the asserted claims. The "mode converter" is a sophisticated optical imaging system that carefully matches input and output optical conditions in order to produce the high-quality amplified beam of light. The substance of IPG's proposed construction is taken, almost verbatim, from the definition for this term set forth in the '630 patent. By contrast, IMRA's proposed construction seeks improperly to genericize this term, by rewriting it from a specific structural component to an entirely functional "black box." The patent law requires specificity and definiteness, and the purely functional construction that IMRA is proposing for the structural "mode converter" limitation simply does not pass muster under applicable legal standards.

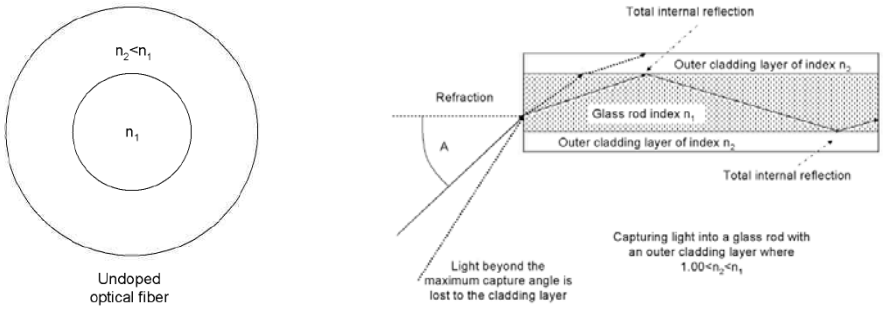
IPG's proposed constructions on the remaining three terms are likewise fully supported by the law and the intrinsic evidence. Remarkably, for these three terms, IMRA fails to offer any construction whatsoever, saying simply that the terms are to be construed according to their

"ordinary meaning." But these terms all use technically complex terminology, well outside the ken of the lay juror, and their meanings are also informed by the intrinsic record. The law is clear that IMRA cannot avoid resolution of the disputes regarding these terms by declining to take any position on them. The very purpose of claim construction is to determine the meanings of any disputed terms of the patent claims, to enable them to be applied to the facts of the case. IMRA's refusal to engage on these three terms frustrates this objective, and IPG respectfully requests the Court to adopt IPG's proposed constructions.

II. BACKGROUND

A. General Background

This '630 patent concerns optical fibers, specifically optical fiber amplifiers. An "optical fiber" is a long, thin strand of glass that allows light to travel within it along its length. Typically, an optical fiber includes a core material surrounded by a "cladding" material. Under proper conditions, light traveling along the length of the fiber is confined in the core. (Ex. 2, Bucksbaum Dec., ¶¶ 11-12; Ex. 3, Knox Inf., ¶¶ 28, 35.)[1] The figures below show exemplary cross-sectional (left) and side (right) views of a fiber showing the core, the cladding, and a confined beam:

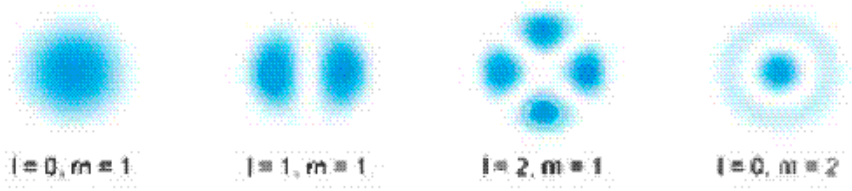


(Ex. 3, Knox Inf., ¶¶ 35, 48.)

[1] Throughout this brief, IPG cites to sections of the expert reports of IMRA's technical expert, Wayne Knox. While IPG disputes many of Dr. Knox's opinions, it has tried to identify areas of common ground to minimize the disputes on the issues germane to claim construction.

Light that travels through an optical fiber does not fill the fiber uniformly the way water fills a hose, but rather fills the fiber in discrete cross-sectional patterns known as "modes." The modes are like the standing wave patterns of a struck drum head, or the patterns of standing waves on the surface of a cup of coffee, and are caused by optical wave interference at the boundary between the core and the cladding, where the index of refraction changes. (Ex. 2, Bucksbaum Dec., ¶ 13; Ex. 3, Knox Inf., ¶¶ 37-41.)

Fibers have what is called a "fundamental" mode, known as (LP_{01}). For cylindrical fibers, the fundamental mode has the cylindrically symmetric intensity pattern shown in the leftmost figure below, with the most light concentrated on the axis of the core, and with the light intensity dropping smoothly off toward the boundary between the core and the cladding. The next three modes (LP_{11}, LP_{21}, LP_{02}), called "higher-order" modes, are shown progressively to the right of the fundamental mode:



(Ex. 3, Knox Inf., ¶ 44.)

A given fiber can only "support" a finite number of modes, meaning that the light traveling through the fiber can have its energy content distributed among any or all of the supported modes. For example, the energy content of the light traveling through the fiber can all be in just one of the supported modes, or it can be distributed among several, or even all, of the supported modes. Various factors determine the number of modes that a fiber can support. For example, all else being equal, a fiber having a smaller-diameter core will support fewer modes than a fiber having a larger-diameter core. (Ex. 2, Bucksbaum Dec., ¶ 16; Ex. 3, Knox Inf., ¶¶

46-47.)

One type of fiber is a "single-mode" (or "SM") fiber. A SM fiber will only support, for a given wavelength of light, a single mode, i.e. only the fundamental mode, shown in the leftmost figure above, can travel through the fiber. (Ex. 2, Bucksbaum Dec., ¶ 14; Ex. 3, Knox Inf., ¶ 43.)

A "multi-mode" (or "MM") fiber supports more than one mode. One of these modes is always the fundamental mode. That is, a MM fiber always supports a fundamental mode with the same general ***shape*** as the fundamental mode supported by a SM fiber, although the ***size*** of the fundamental mode supported by a MM fiber can be different than the one supported by a SM fiber. (Ex. 2, Bucksbaum Dec., ¶ 15; Ex. 3, Knox Inf., ¶¶ 41-47.)

While light output from a MM fiber can have its energy content distributed among multiple, or even all, of the modes supported by that fiber, for many applications it is generally desirable to have all of the energy content in the fundamental mode because it is "diffraction-limited," and can therefore improve focusing. (Ex. 2, Bucksbaum Dec., ¶ 15; Ex. 3, Knox Inf., ¶¶ 43, 57.)

SM and MM fiber can be either passive or active. Passive fiber essentially uses a glass core, and is used, for example, to transmit light from one location to another. Active fiber is used to amplify light traveling through the fiber. Active fiber (also called a fiber amplifier) usually has special amplifying atoms ("dopants") in the core material. A separate light source, called a "pump light source," is introduced into the core to provide energy to the dopants, which is then transferred to the light beam traveling through the fiber core to amplify it, thus increasing its energy content. (Ex. 2, Bucksbaum Dec., ¶¶ 21-22; Ex. 3, Knox Inf., ¶¶ 48-51.)

B. The '630 Patent

The object of the '630 patent is to amplify light passing through a MM active fiber, such that the energy content of the amplified light at the output of the MM active fiber is in the

fundamental mode, rather than being distributed among multiple modes. (Ex. 1, '630 patent, Abstract.)

The '630 patent employs a MM fiber amplifier because it has a larger cross-sectional area than a SM fiber amplifier, which allows more energy to be introduced into it, and so can provide greater amplification. (*Id.* at 3:9-12, 4:34-43, 12:32-34.) For example, in discussing a certain prior art SM fiber amplifier, the patent states: "the use of SM optical fibers is disadvantageous, [be]cause the limited core area limits saturation energy of the optical fiber and thus the obtainable pulse energy." (*Id*. at 1:43-46.)

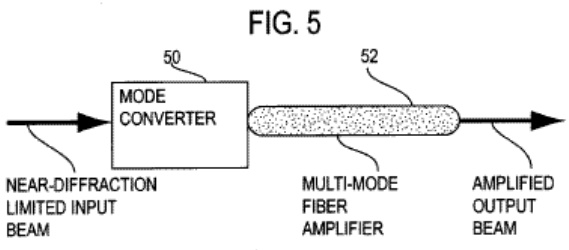
Conversely, because a MM fiber amplifier supports many modes, the amplified output beam from a MM fiber amplifier can potentially include energy content distributed among multiple modes, resulting in an output beam quality that is lower than if all of the energy is in the fundamental mode. (*See, e.g.*, *Id.* at 2:2-7.)

The goal of the '630 patent is thus to maximize the energy content in the fundamental mode of the beam at the output of a MM fiber amplifier (*Id.* at 4:5-7; "[t]he inventors are not aware of any prior art using MM fibers to amplify SM signals where the output remains primarily in the fundamental mode.")

The patent purports to achieve this result using two technologies. First, a "mode converter" is used to carefully "launch" the beam into the input end of the MM fiber amplifier, so that all of the beam starts off in the fundamental mode of the MM fiber amplifier. (*Id*. at Abstract; "a single-mode is launched into the MM fiber by matching the modal profile of the fundamental mode of the MM fiber with a diffraction-limited optical mode at the launch end.") Second, the MM fiber amplifier is designed so that as the beam travels through it, the higher-order modes are not excited; i.e., the fundamental mode is preserved to avoid energy migrating to

the other modes. (*Id.*; "The fundamental mode is preserved in the MM fiber by minimizing mode-coupling … .") If both of these criteria are satisfied, then the energy of the beam that exits the MM fiber amplifier will all be in the fundamental mode.

As noted, the patent uses a "mode converter" to carefully launch the beam into the MM fiber amplifier to satisfy the first criterion. The "mode converter" matches the modal profile of the fundamental mode of the MM fiber. (*Id.* at Abstract, 10:26-28, and claim 1.) The mode converter is depicted schematically in Figure 5 (*Id.* at 10:21-24):



The '630 patent defines the "mode converter" as an optical imaging system, such as a lens system or a tapered fiber, that is capable of matching the mode of the MM fiber amplifier, i.e., the fundamental mode of the MM fiber amplifier (*Id.* at 10:26-34):

> The mode-converter 50 can consist of any type of optical imaging system capable of matching the mode of the MM amplifier 52. For example, a lens system may be employed. Alternatively, a section of tapered fiber may be employed, such that the output mode at the end of the tapered fiber is matched to the mode of the MM amplifier fiber 52. In this case, the mode-converter can be spliced directly to the MM fiber 52 producing a very compact set-up.

The '630 patent provides test data (shown in FIG. 3) depicting the energy content of an amplified output beam that, because of an "optimum mode-match" by the mode converter at the input of the MM fiber amplifier, is substantially in the fundamental mode. By comparison, it also provides test data (shown in FIG. 4) depicting the energy content of an amplified output that, because of a "non-optimum mode-match" by the mode converter at the input of the MM fiber amplifier, is not substantially in the fundamental mode. (*Id.* at 10:1-10; Ex. 3, Knox Inf., ¶¶ 74-77.) These test data are shown and discussed further below.

III. THE LAW OF CLAIM CONSTRUCTION

A. Claim Construction Generally

The claims of a patent are the individually numbered sentences at the end of the patent that define the scope of protection offered by a patent. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*) ("It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude'"). Disputes regarding the scope of a patent, as defined by the claims, are resolved through claim construction proceedings to determine the meanings of disputed words or phrases in the claims. *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 372 (1996) ("the construction of a patent, including terms of art within its claim, is exclusively within the province of the court.").

In short, the claim construction process is intended to answer the questions "what did the inventor actually invent?" and "what is the inventor entitled to exclude others from doing?"

> [T]he interpretation to be given a [patent claim] term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop in the claim. The construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction.

Phillips v. AWH Corp., 415 F.3d at 1315 (quoting *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998)).

If the case proceeds to trial, the Court's claim constructions will provide the jury with the meaning of the claims to evaluate infringement and validity. This is especially important in cases such as this one that involve technology and terminology that might be unfamiliar to some laypeople. By providing a definition of the disputed terms, the Court focuses the liability questions. It is therefore important for the Court to resolve any claim construction disputes raised by the parties. *O2 Micro Intern. Ltd. v. Beyond Innovation Technology Co., Ltd.*, 521 F.3d 1351, 1361 (Fed. Cir. 2008) (claim construction required where the parties disputed not the

meaning of the words themselves, but the scope that should be encompassed by this claim language).

B. The Canons of Claim Construction

Claim construction involves determining the meaning of the claim to someone having an ordinary level of skill in the art at the time of the invention. *See Phillips*, 415 F.3d at 1312-13. This involves placing "the claim language in its proper technological and temporal context." *Gillette Co. v. Energizer Holdings, Inc.*, 405 F.3d 1367, 1370 (Fed. Cir. 2005). The intrinsic evidence, "i.e., the patent itself, including the claims, the specification and, if in evidence, the prosecution history … is the most significant source of the legally operative meaning of disputed claim language." *Vitronics Corp. v. Conceptronics, Inc.*, 90 F.3d at 1582 (Fed. Cir. 1996). The specification "is the single best guide to the meaning of a disputed term." *Phillips*, 415 F.3d at 1315. Where the patentee defines a claim term in the patent specification, that definition controls. *Abbott Laboratories v. Novopharm Ltd.*, 323 F.3d 1324, 1330 (Fed. Cir. 2003). In the absence of such a definition, the specification "can provide guidance as to the meaning of the claims, thereby dictating the manner in which the claims are to be construed, even if the guidance is not provided in explicit definitional format." *Scimed Life Systems, Inc. v. Advanced Cardiovascular Systems*, 242 F.3d 1337, 1344 (Fed. Cir. 2001).

The prosecution history very often "inform[s] the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim construction narrower than it otherwise would be." *Phillips*, 415 F.3d at 1317.

Extrinsic evidence, to the extent not at odds with the intrinsic record, while generally of less weight than intrinsic evidence in construing the claims, can in limited circumstances also be useful in claim construction. *Phillips*, 415 F.3d at 1317-18. Although extrinsic evidence in the

form of expert testimony can in limited circumstances be considered by the court, it is generally "less reliable than the patent and its prosecution history in determining how to read claim terms." *Phillips*, 415 F.3d at 1318.

IV. THE DISPUTED CLAIM TERMS

All of the claim terms in dispute appear in claim 1, which is reproduced below with the four disputed claim terms emphasized:

> 1. An optical amplification system, comprising:
> a laser source generating an input beam having a nearly diffraction limited mode;
> a multi-mode fiber amplifier;
> a *mode converter* receiving the input beam and *converting the mode of the input beam to match a fundamental mode of the multi-mode fiber amplifier*, and providing a *mode-converted input beam* to said multi-mode fiber amplifier; and
> a pump source coupled to said multi-mode fiber amplifier, said pump optically pumping said multi-mode fiber amplifier, said multi-mode fiber amplifier providing at an output thereof *an amplified beam substantially in the fundamental mode*.

('630 patent, claim 1.)

A. "Mode Converter"

IPG's Proposed Construction	IMRA's Proposed Construction
An optical imaging system, such as a lens system, a section of tapered fiber, or a combination thereof, capable of matching the mode of a multi-mode fiber amplifier	An element capable of matching the mode of a multi-mode fiber amplifier

The primary difference between the parties' competing constructions is that IPG proposes that the claimed mode converter is, as defined in the patent specification, an "optical imaging system," whereas IMRA proposes that it is merely an "element." This is the only substantive difference between the parties' respective constructions.

IPG also proposes to include in the construction the exemplary optical imaging systems identified in the patent specification and other claims, namely, a lens system or a section of tapered fiber, or a combination of the two. This is exemplary only, and is non-limiting, as made

clear by the language "such as" in IPG's proposal. This is purely to increase clarity for the benefit of the jury, and to assist them in applying the construction. The parties' extensive meet-and-confer, which was successful at resolving and narrowing a number of disputes, did not reveal why IMRA opposes such non-limiting clarification. Because it is purely for clarification, IPG would not oppose the deletion of "such as a lens system, a section of tapered fiber, or a combination thereof" from its proposed construction if the Court does not believe such illustrations would assist the jury.

The parties agree that the mode converter must be "capable of matching the mode of a multi-mode fiber amplifier." As this clause of the claim further states, the "mode" of the multi-mode fiber amplifier that must be matched is its fundamental mode.

1. IPG's Proposed Construction Tracks The Express Definition Set Forth In The '630 Patent

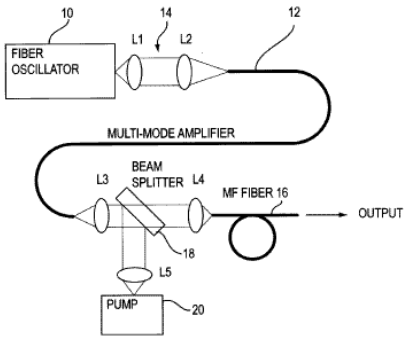
The parties agree that the term "mode converter" must be construed in light of the specification of the '630 patent. IPG's construction is taken directly from the definition set forth in the patent, whereas IMRA is attempting to eliminate from that definition the plain and express requirement of an "optical imaging system." In particular, the '630 patent states that "[t]he mode-converter 50 can consist of any type of ***optical imaging system*** capable of matching the mode of the MM amplifier 52." ('630 patent, 10:26-28, emphasis added.) Given that it is undisputed that the "MM amplifier" means the "multi-mode fiber amplifier" referred to elsewhere in the claim, this is verbatim IPG's proposed construction, i.e.: "An optical imaging system … capable of matching the mode of a multi-mode fiber amplifier." Where, as here, a patentee provides an explicit definition for a claim term in the specification, that definition controls. *Abbott*, 323 F.3d at 1330. The rest of IPG's proposed construction (the "such as" portion represented by the ellipses in the preceding quote) is a non-limiting list of all of the

examples of such optical imaging systems given in the specification, namely, a lens system or a section of tapered fiber "may be employed" as this optical imaging system. ('630 patent, 10:26-31.)[2]

2. IPG's Proposed Construction Is Further Confirmed By Other Portions Of The '630 Patent Specification, The Prosecution History, And The Statements Of The Inventors In Another Of Their Patents

The '630 patent specification and prosecution history further confirm that the "matching" function of the claimed mode converter, on which the parties agree, is performed using an "optical imaging system," as recited in IPG's construction.

For example, in the embodiment shown in FIG. 1 (reproduced below), the mode converter is "[a] two-lens telescope 14 (L1 and L2) [that] is used to match the mode from the oscillator 10 to the fundamental mode of the MM [fiber] amplifier 12." ('630 patent, 6:6-8; Ex. 3, Knox Inf., ¶ 70.) This two-lens telescope is an example of an optical imaging system. ('630 patent, 10:28-29.) The two-lens telescope 14 in FIG. 1 is used to change the size of the single-mode output from oscillator 10 so that it matches the fundamental mode of multi-mode fiber amplifier 12, as recited in claim 1. ('630 patent, 6:6-8; Ex. 2, Bucksbaum Dec., ¶ 23; Ex. 3, Knox Inf., ¶ 70.)



[2] These examples are also consistent with dependent claims 17 to 19 of the '630 patent as issued and originally filed, which respectively recite that the mode converter comprises "a bulk-optic imaging system" (an example of which is a lens system), "a tapered single-mode fiber," or "a combination of a bulk-optic imaging system and a tapered single-mode fiber." ('630 patent, claims 17-19; Ex. 4, '630 application, claims 17-19 at 34).

The section of tapered fiber discussed at 10:28-33 of the '630 patent is another example of an optical imaging system. It images a mode from one end of the fiber section to the other end of the fiber section, and changes the size of the mode based on the taper. ('630 patent, 10:26-34; Ex. 2, Bucksbaum Dec., ¶ 24.)

Moreover, during reexamination of the '630 patent before the Patent Office, IMRA further confirmed that the claimed "mode converter" involves an optical imaging system. Specifically, as part of a section entitled "The mode converter limitation," it said:

> An illustrative example of matching the fundamental mode of a fiber with an input beam is schematically illustrated in Figure 1 below.

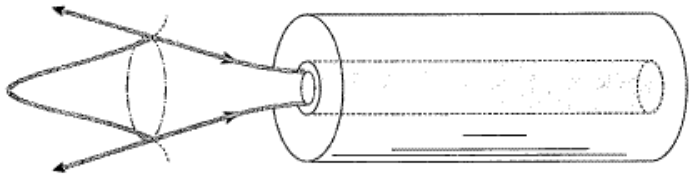


Fig. 1 – Schematic illustration of mode matching an input beam with the fiber fundamental mode

(Ex. 5, '630 Reexamination Amendment, p. 16.) This figure shows the focusing of the input beam to the correct size at the input of the multimode fiber amplifier. Specifically, the input beam is depicted on the left, with the focusing depicted by the converging top and bottom lines. The sideways bell curve indicates a diffraction limited input beam. (Ex. 2, Bucksbaum Dec., ¶¶ 29-30.) For the mode converter to achieve the focusing shown in IMRA's own figure depicting mode-matching, it must be an optical imaging system. (Ex. 2, Bucksbaum Dec., ¶ 30.) Thus, IMRA's explanation of "the mode converter limitation" during reexamination further confirms that it requires an optical imaging system, just as defined in the specification of the '630 patent. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 980 (Fed. Cir. 1995).

The inventors of the '630 patent have also confirmed and reiterated in another of their

patents that a "mode converter" employs an optical imaging system to match the mode of a multimode fiber amplifier. *See* U.S. Patent No. 7,190,511 ("the '511 patent").[3] First, the '511 patent discusses the '630 patent, and in doing so expressly characterizes the invention of the '630 patent as "excitation of the fundamental mode of [a multimode fiber amplifier] via the use of appropriate mode-matching bulk optics or fiber tapers … ." (Ex. 6, '511 patent, 3:9-17.) Notably, the '511 patent, which was filed just a year after the '630 patent, does not characterize the invention of the '630 patent as broadly as IMRA now contends, or otherwise state the invention of the '630 patent is merely the use of any "element" to achieve mode-matching.

Second, and contrary to the overbroad position IMRA now takes, the inventors further underscored in the '511 patent that a "mode converter" employs an optical imaging system to achieve mode-matching. Specifically, Figure 1 of the '511 patent shows a "mode converter," labeled 102. The mode converter is used "to achieve excitation of only the fundamental mode in a multi-mode core fiber amplifier … ." (*Id*. at 5:51-52.) The '511 patent further states that "[t]he essential function of this mode-matching optical arrangement," i.e., the "mode converter" shown as 102 in Figure 1, "is to transform the mode size of an optical beam at the output of the [laser source] into the proper beam size." (*Id*. at 5:59-63.) The '511 patent calls this an "*imaging function*" that "can be achieved by a variety of *optical arrangements* …." (*Id*. at 5:63-65, emphasis added.) Thus, like the '630 patent, the '511 patent states that a "mode converter" is an optical imaging system that transforms the mode size into the proper beam size.

3. IMRA Cannot Use Claim Construction To Rewrite The Definition For Mode Converter Set Forth In The '630 Patent

[3] The '511 patent was filed on July 16, 1998, and issued on March 13, 2007. It is not part of the same patent family as the '630 patent, and so is not intrinsic evidence for purposes of claim construction. *Goldenberg v. Cytogen, Inc.*, 373 F.3d 1158, 1168 (Fed. Cir. 2004). However, it is further extrinsic evidence confirming that persons of skill in the relevant field, including the '630 inventors themselves, consider a "mode converter" to be an "optical imaging system." *Phillips*, 415 F.3d at 1319 ("[E]xtrinsic evidence can help educate the court regarding the field of the invention and can help the court determine what a person of ordinary skill in the art would understand claim terms to mean").

IMRA relies on precisely the same definition of mode-converter at 10:26-28 of the '630 patent discussed above to support its proposed construction. (*See* Joint Claim Construction Statement, Doc. 78-2 at 2.) However, IMRA deletes from this definition the plain requirement that the mode converter is an "optical imaging system." IMRA substitutes for this structural term the generic term "element." But the '630 patent never describes the "mode converter" as an "element." IMRA cannot, twelve years after filing its patent application, and with the patent now in litigation, rewrite its claims, or the definition of "mode converter" in its specification. *Helmsderfer v. Bobrick Washroom Equipment, Inc.*, 527 F.3d 1379, 1383-84 (Fed. Cir. 2008) ("[C]ourts can neither broaden nor narrow claims to give the patentee something different than what he has set forth").

By proposing "an element" for the claimed mode converter, IMRA is attempting to expand the meaning of "mode converter" to be devoid of any structure whatsoever. Evidently, IMRA contends that the claimed mode converter is entirely functional, and can be ***anything*** that is "capable of matching the mode of a multi-mode fiber amplifier." This is not what the patent specification says. It says that a mode converter is "any type of optical imaging system" ('630 patent, 10:26-27), not "any element," as IMRA proposes.

Moreover, a patent claim cannot encompass all structures for performing a recited function. *Aristocrat Technologies Australia Pty Ltd. v. International Game Technology*, 521 F.3d 1328, 1333 (Fed. Cir. 2008). Indeed, if IMRA had written the claim term "mode converter" exactly as it now proposes in its construction, then it would be subject to a special requirement of patent law, the so-called "means plus function" requirement set forth in 35 U.S.C. § 112, ¶ 6. That section governs the construction of claim terms that are recited in functional terms, without sufficient structure in the claim language to perform the recited function. *Massachusetts Institute*

of Technology and Electronics For Imaging, Inc. v. Abacus Software, 462 F.3d 1344, 1353 (Fed. Cir. 2006). This requirement exists to ensure that patentees are not granted patent rights on purely functional claims.

IMRA's proposed construction fails to recite sufficiently definite structure, in general, and fails to recite sufficient structure for performing the recited function, in particular, and so would require construction under § 112, ¶ 6, if the term had originally been written as broadly as IMRA now proposes. For example, in *Mas-Hamilton Group v. LaGard, Inc.*, 156 F.3d 1206, 1214 (Fed. Cir. 1998), the Federal Circuit concluded that the claim term "lever moving *element*" did not recite sufficient structure because it "is described in terms of its function not its mechanical structure." The claim term "element" thus was not construed to cover all possible elements for performing the function recited in the claim: The term "cannot be construed so broadly to cover every conceivable way or means to perform the function of moving a lever, and there is no structure recited in the limitation that would save it from application of Section 112, ¶ 6." *Id*. at 1214. Similarly, in *Welker Bearing Company v. PHD, Inc.*, 550 F.3d 1090, 1096 (Fed. Cir. 2008), the Federal Circuit determined that a "mechanism for moving said finger" did not recite sufficient structure, and so could not be construed to cover all "mechanisms" for performing the recited function.

Had IMRA originally written the claimed "mode converter" using the language that it now proposes in its claim construction, the term would have been construed to cover only the examples provided in the specification for performing the function of the claim, namely, a lens system, a section of tapered fiber, or a combination thereof. *Id*. at 1097; 35 U.S.C. § 112, ¶ 6 (means-plus-function claim terms "shall be construed to cover the corresponding structure, material, or acts described in the specification or equivalents thereof"). IMRA's proposal to

construe a particular structural term with the generic, and wholly functional, term "element" is thus improper under the law.

B. "Converting the Mode of the Input Beam to Match a Fundamental Mode of the Multi-Mode Fiber Amplifier"

IPG's Proposed Construction	IMRA's Proposed Construction
Converting the mode of the input beam to cause it to match a fundamental mode of the multi-mode fiber amplifier	Ordinary Meaning

The dispute here concerns IPG's proposal to insert the words "to cause it" before the words "to match" in the claim language. IPG's proposed construction properly clarifies the causal relationship between the "converting" and the resulting "match."

The claimed "converting" is not arbitrary. It is purposeful. The objective of "converting" is "*to match*." The conversion causes the match, and conversely, the match results from that conversion.

The intrinsic record confirms this. For example, as discussed in the previous section, two-lens telescope 14 shown in FIG. 1 of the '630 patent changes the size of the single-mode output from oscillator 10 so that it matches the fundamental mode of multi-mode fiber amplifier 12. This change in size causes the match. Conversely, without this correct change in size, there is no match to the fundamental mode of the multi-mode fiber amplifier.

Similarly, when IMRA distinguished a certain piece of prior art (Yang) during the reexamination of the '630 patent, it did not argue that Yang did not disclose "converting the mode of the input beam," as claimed. (Ex. 5, '630 Reexamination Amendment, pp.16-20.) It instead calculated the size of the focused beam produced by the microscope objective in Yang, and argued that this focusing in Yang was "too small to match the fundamental mode of the

multimode fiber amplifier." (*Id.* at 18.) Thus, IMRA admitted that there was conversion of the input beam, but contended that that conversion did not *cause* the input beam to match the fundamental mode of the multimode fiber amplifier. In short, during the reexamination, IMRA relied on the causal relationship between "converting" and "to match" to distinguish its claims from the Yang prior art, and IPG's proposed construction properly seeks to make that causation clear and express. *Phillips* at 415 F.3d at 1317 ("[T]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention").

C. "Mode-Converted Input Beam"

IPG's Proposed Construction	IMRA's Proposed Construction
An input beam whose mode has been converted to match a fundamental mode of the multi-mode fiber amplifier	Ordinary meaning

Based on its plain language, a mode-converted input beam is an input beam whose mode has been converted. IPG's proposed construction merely clarifies that the converted mode of the input beam matches the fundamental mode of the multi-mode fiber amplifier. This is clear from the context in which this term is used in the claim: "a mode converter receiving the input beam and converting the mode of the input beam to match a fundamental mode of the multi-mode fiber amplifier, and providing *a mode-converted input beam* to said multi-mode fiber amplifier." ('630 patent, claim 1, emphasis added.) Clearly the "mode-converted input beam" that is provided to the multi-mode fiber amplifier is the one referred to in the first clause, i.e., the beam that has been converted "to match a fundamental mode of the multi-mode fiber amplifier." *Phillips v. AWH*, 415 F.3d at 1314 ("[T]he context in which a term is used in the asserted claim can be highly instructive" to the construction of that term).

Putting these pieces together yields IPG's proposed construction for "mode-converted input beam," i.e., an input beam whose mode has been converted to match a fundamental mode of the multi-mode fiber amplifier. Not only does this follow linguistically, logically, and grammatically from the words of the claim themselves, but IMRA's own expert has conceded the point. For example, in connection with his characterization of FIGS. 1 and 5 in the '630 patent, IMRA's expert directly relates the two when he states: "The mode of the input beam is converted to match a fundamental mode of the multi-mode fiber amplifier and *the* mode-converted input beam is provided to the multi-mode fiber amplifier". (Ex. 3, Knox Inf., ¶¶ 70, 72, emphasis added.) It is unclear why IMRA even disputes IPG's proposed construction.

D. "An Amplified Beam Substantially in the Fundamental Mode"

IPG's Proposed Construction	IMRA's Proposed Construction
An amplified beam having substantially all of its energy content in the fundamental mode	Ordinary meaning

As drafted, this claim term is ambiguous, in that it fails to define what it means for a beam of light to be "in" the fundamental mode. IPG's proposed construction, which is well-supported by the '630 patent specification and claims, as well as by general technical principals on which the parties' experts agree, specifies that this means that substantially all of the ***energy content*** of the amplified beam is in the fundamental mode.

Every beam of light contains energy, or power (power being energy per unit time). The purpose of an optical amplification system is to increase the power of the beam. (Ex. 2, Bucksbaum Dec., ¶¶ 18-20, 22; Ex. 3, Knox Inf., ¶ 52.) Claim 20 of the '630 patent expressly refers to the "energy of the amplified beam." ('630 patent, claim 20.)

As noted above, because a multi-mode fiber can support many modes, a beam amplified

in a multi-mode fiber amplifier can potentially have its energy content distributed among the many modes, including the "fundamental mode" and other, "higher-order," modes. (Ex. 3, Knox Inf., ¶ 100; Ex. 2, Bucksbaum Dec., ¶¶ 15, 21.) The objective of the '630 patent is to maintain the energy in the fundamental mode as the beam is amplified by the MM amplifier fiber. (*See, e.g.*, '630 patent, Abstract; "The fundamental mode is preserved in the MM fiber".)

The '630 patent also explains that whether an amplified output beam is "substantially in the fundamental mode" can be determined by evaluating the "energy content of higher-order modes" relative to the energy content of the fundamental mode. ('630 patent, 10:11-18.) IMRA's expert agrees that this claim limitation involves an inquiry into "how much of the power in the amplified beam is in the fundamental mode." (Ex. 7, Knox Reb., ¶ 105.)

An example of this is shown in FIGS. 3 and 4 of the '630 patent (reproduced below), each of which depicts a central peak that represents the energy content in the fundamental mode. ('630 patent, 10:1-10; Ex. 2, Bucksbaum Dec., ¶¶ 25-27; Ex. 3, Knox Inf., ¶¶ 74-77.) The measurement in FIG. 3 results from "optimum mode-matching conditions" and shows that "secondary peaks [due to the excitation of higher-order modes] are suppressed to better than 1% … ." ('630 patent, 10:9.) In short, this figure purports to depict the energy content of an amplified beam "substantially in the fundamental mode" because only "a very small amount (in this example, about 1%) of the power is contained in the first higher order mode" and there are no visible peaks corresponding to any other higher-order mode. (Ex. 3, Knox Inf., ¶ 75.) In other words, an amplified beam that has at least 99% of its energy content in the fundamental mode is substantially "in" the fundamental mode.

FIG. 3

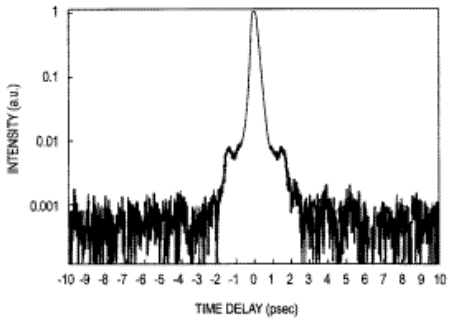
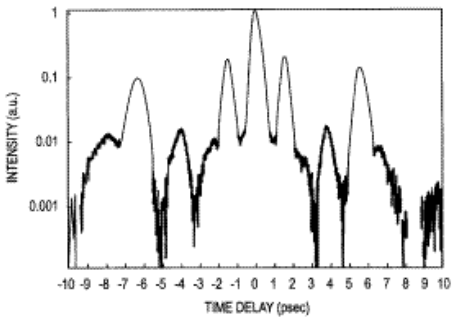


FIG. 4



On the other hand, the measurement in FIG. 4 results from a "non-optimum mode-match" and "displays several peaks due to the excitation of higher-order modes." ('630 patent, 10:5-7.) This is an example of an amplified beam that is not "substantially in the fundamental mode," because the many additional peaks "reveal that significant power is contained in several higher-order modes." (Ex. 3, Knox Inf., ¶ 77.) Specifically, only about 75-80% of the energy content of the amplified beam is in the fundamental mode. (Ex. 2, Bucksbaum Dec., ¶ 27.) Thus, the measurement result in FIG. 4 is an example of an amplified beam that is not "substantially in the fundamental mode," as reflected by its lower energy content in that mode.

These two examples clearly demonstrate that when the claim refers to "an amplified beam substantially ***in*** the fundamental mode," it means that substantially all of the energy content of the amplified beam is in the fundamental mode, as proposed by IPG.

V. CONCLUSION

For all of the foregoing reasons, Defendant IPG Photonics Corporation respectfully requests that the Court adopt its proposed constructions of the disputed terms.

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CERTIFICATE OF SERVICE

I hereby certify that on December 8, 2009, I electronically filed the foregoing paper with the Clerk of the Court using the ECF system which will send notification of such filing to the following:

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